WHAT IS CLAIMED IS:

1. A computer implemented method for unified simulation of a system design and an application program, comprising:

     identifying a memory component and a processor component of said system design;

5   identifying a software component of said application program;

     creating a programming model of said memory component and said processor component;

     associating said software component with said programming model of said memory component within a simulation environment; and

10   executing said system design and said application program in said simulation environment whereby said software component is simulated in association with said memory component and said processor component.

2. The computer implemented method of claim 1 whereby the executing said system design and said application program in said simulation environment step further comprises:

15   generating cycle accurate information for said system design in said simulation environment.

3. The computer implemented method of claim 1 further comprising:

     creating a set of function calls in a high level general purpose programming language;

     linking said memory component with a processor component wherein said link comprises

20   at least one of said set of function calls; and

executing said system design and said application program in said simulation environment.

4. The computer implemented method of claim 3 wherein said executing step further comprises:

reading said software component from said memory component into said processor

5   component through said link;

processing instructions of said software component on said processor component during said simulation; and

generating cycle accurate information in said simulation environment

5. The computer implemented method of claim 4 wherein said generating step further

10   comprises:

dividing activities in said simulation environment into a first plurality of activities comprising an execute phase and a second plurality of activities comprising an update phase;

computing said first plurality of activities comprising said execute phase at a clock edge of a virtual system clock;

15   updating at said clock edge a state of said simulation environment; and

computing said second plurality of activities comprising said update phase at said clock edge.

6. The computer implemented method of claim 1 wherein said programming model is created in a high level general purpose programming language.

7. A computer implemented method for simulating a digital system design and an application

program in a single simulation environment comprising:

creating a system design model in a high level general purpose programming language,

wherein said system design model is comprised of at least a processor component and a

5   memory component;

operatively associating said application program with said memory component;

executing said system design model and said application program in said single

simulation environment wherein said processor component simulates the operation of said
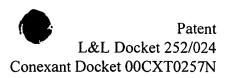
application program; and

10   maintaining cycle accurate information during the simulation.

8. The computer implemented method of claim 7 wherein said operatively associating step

further comprises:

creating a set of function calls in a high level general purpose programming language;

and

15   linking said memory component with said processor component wherein said link

comprises at least one of said set of function calls.

9. The computer implemented method of claim 8 wherein said executing step further comprises:

reading said software component from said memory component into said processor

component through said link; and

20   processing instructions of said software component on said processor component during

said simulation.

10. The computer implemented method of claim 7 wherein said maintaining step further

comprises:

dividing activities in said simulation environment into a first plurality of activities and a

second plurality of activities;

5   computing said first plurality of activities at a clock edge;

updating at said clock edge a state of said single simulation environment; and

computing said second plurality of activities at said clock edge.

11. A computer program product for simulating hardware and software components in a single

simulation environment, said computer program product comprising:

10   instructions for identifying a memory component, a processor component, and at least

one software component comprised of computer program instructions;

instructions for creating a model of said memory component and said processor

component in a high level general purpose programming language;

instructions for creating a set of function calls in a high level general purpose

15   programming language;

instructions for communicatively linking said models of said memory component and

said processor component wherein said link comprises at least one of said set of function

calls;

instructions for operatively associating said at least one software component with said

20   model of said memory component; and

instructions for executing said components in said single simulation environment

whereby said model of said processor component reads said at least one software component from said model of said memory component through said link and said model of said processor component performs said computer program instructions contained within said software component.

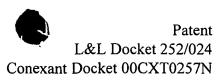5   12. A method for simulating a design and a program, comprising:

creating a memory model and a processor model;

associating a software component with said memory model within a simulation environment; and

executing said design and said program in said simulation environment whereby said

10   software component is simulated in association with said memory model and said processor model.

13. The method of claim 12 wherein said simulation environment is an HDL simulation environment and said executing step generates cycle accurate information.

14. The method of claim 13 wherein said software component contains a set of instructions and

15   said executing step further comprises said processor model executing said set of instructions of said software component associated with said memory model.

15. A computer program product for simulating a design and a program, comprising:

instructions for instantiating a memory model and a processor model in a simulation environment;

instructions for associating a software component with said memory model within said

5   simulation environment; and

instructions for executing said design and said program in said simulation environment whereby said software component is simulated in association with said memory model and said processor model.

16. The computer program product of claim 15 wherein said simulation environment is an HDL

10   simulation environment and said instructions for executing generate cycle accurate information.

17. The computer program product of claim 16 wherein said instructions for executing further comprise instructions for said processor model to execute instructions of said software component associated with said memory model.